

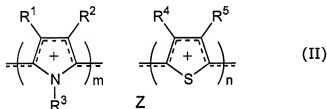
AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (canceled).

2. (currently amended): A π -conjugated copolymer comprising a pyrrole-based unit and a thiophene-based unit represented by the general formula (II), and an electrochemically and/or chemically doped structure:



wherein R^1 , R^2 , R^4 , and R^5 independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, R^1 and R^2 , and R^4 and R^5 may be bonded together at any positions respectively to form at least one 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure, the ring structure may arbitrarily contain a carbonyl bond, an ether bond, an ester bond, an amide bond, a sulfide bond, a sulfinyl

bond, a sulfonyl bond, and an imino bond, the hydrocarbon forming the ring structure may have a group selected from the group consisting of linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, R^3 represents a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, m and n represent a composition ratio of the π -conjugated copolymer and satisfy the conditions of $m+n=1$ and $0 < m \leq 0.75$, $0.05 \leq m < 0.1$, and Z represents a counter anion with dopability.

3-4. (canceled).

5. (original): The π -conjugated copolymer having the electrochemically and/or chemically doped structure according to claim 2, wherein the pyrrole-based unit is such that R^1 and R^2 in the general formula (II) independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10

carbon atoms, halogen atom and a cyano group, alternatively, R^1 and R^2 are bonded together at any positions to form a 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure that may contain an ether bond and/or a sulfonyl bond, and R^3 represents a hydrogen atom.

6. (original): The π -conjugated copolymer according to claim 5, wherein the pyrrole-based unit is pyrrole.

7-8. (canceled).

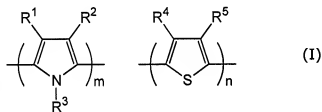
9. (original): The π -conjugated copolymer having the electrochemically and/or chemically doped structure according to claim 2, wherein the thiophene-based unit is such that R^4 and R^5 in the general formula (II) independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom and cyano group, alternatively R^4 and R^5 are bonded together at any positions to form a 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure that may contain an ether bond and/or a sulfonyl bond.

10. (original): The π -conjugated copolymer according to claim 9, wherein the thiophene-based unit is 3,4-ethylenedioxythiophene.

11. (previously presented): The π -conjugated copolymer according to claim 2, having an electric conductivity of 5 S/cm or more.

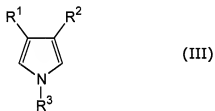
12. (withdrawn-currently amended): A method for producing a π -conjugated copolymer of claim 1

comprising a pyrrole-based unit and a thiophene-based unit represented by the general formula (I):



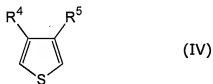
wherein R¹, R², R⁴, and R⁵ independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, R¹ and R², and R⁴ and R⁵ may be bonded together at any positions respectively to form at least one 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure, the ring structure may arbitrarily contain a carbonyl bond, an ether bond, an ester bond, an amide bond, a sulfide bond, a sulfinyl bond, a sulfonyl bond, and an imino bond, the hydrocarbon forming the ring structure may have a group selected from the group consisting of linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group

having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, R³ represents a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, and m and n represent a composition ratio of the π -conjugated copolymer and satisfy the conditions of $m+n=1$ and $0 < m \leq 0.75$, said method comprising copolymerizing a pyrrole-based compound represented by the general formula (III):



wherein R¹ to R³ have the same meanings as defined in ~~claim 1~~ claim 1 above,

and a thiophene-based compound represented by the general formula (IV):



wherein R⁴ and R⁵ have the same meanings as defined in ~~claim 1~~ claim 1 above, by performing chemical oxidative polymerization in the presence of an oxidizing agent at a polymerization temperature of 60°C or lower.

13. (withdrawn): The method for producing a π -conjugated copolymer according to claim 12, wherein the polymerization is carried out in the presence of a compound containing a counter anion with dopability.

14. (withdrawn): The method for producing a π -conjugated copolymer according to claim 12, wherein the pyrrole-based compound is pyrrole.

15. (withdrawn): The method for producing a π -conjugated copolymer according to claim 12, wherein the thiophene-based compound is 3,4-ethylenedioxythiophene.

16. (withdrawn): The method for producing a π -conjugated copolymer according to claim 12, wherein the oxidizing agent contains an iron salt or a persulfate salt.

17. (withdrawn): The method for producing a π -conjugated copolymer according to claim 13, wherein the compound containing a counter anion with dopability is an organic sulfonic acid compound.

18. (withdrawn): The method for producing a π -conjugated copolymer according to claim 12, wherein a mixed solvent of isopropanol and water is used in the polymerization.

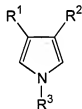
19. (withdrawn): The method for producing a π -conjugated copolymer according to claim 12, wherein the polymerization temperature is 30°C or lower.

20. (withdrawn-currently amended): An article comprising an oxide film formed by electrolytically oxidizing a valve action metal, wherein the oxide film is coated with the π -conjugated copolymer described in claim-~~1~~ 2.

21. (withdrawn): The article according to claim 20, wherein the valve action metal comprises at least one metal selected from the group consisting of aluminum, silicon, tantalum, niobium, titanium and zirconium.

22. (withdrawn-currently amended): A solid electrolytic capacitor, comprising as a solid electrolyte the π -conjugated copolymer described in claim-~~1~~ 2.

23. (withdrawn): A method for producing a solid electrolytic capacitor in which a solid electrolyte layer comprising a π -conjugated copolymer is formed on a dielectric film of porous valve-action metal, which method comprises a step of polymerizing a pyrrole-based compound represented by the general formula (III):

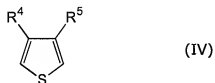


(III)

wherein R^1 and R^2 independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon

atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, R^1 and R^2 may be bonded together at any positions respectively to form at least one 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure, the ring structure may arbitrarily contain a carbonyl bond, an ether bond, an ester bond, an amide bond, a sulfide bond, a sulfinyl bond, a sulfonyl bond, and an imino bond, the hydrocarbon forming the ring structure may have a group selected from the group consisting of linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, and R^3 represents a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent,

and a thiophene-based compound represented by the general formula (IV):



wherein R^4 and R^5 independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to

10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent, and R^4 and R^5 may be bonded together at any positions respectively to form at least one 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure, the ring structure may arbitrarily contain a carbonyl bond, an ether bond, an ester bond, an amide bond, a sulfide bond, a sulfinyl bond, a sulfonyl bond, and an imino bond, the hydrocarbon forming the ring structure may have a group selected from the group consisting of linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom, nitro group, cyano group, primary, secondary or tertiary amino group, trihalomethyl group and phenyl group which may have a substituent,

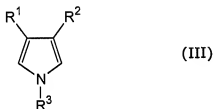
by using a solution of an oxidizing agent having polymerization-initiating property singly or using a mixed solution of such an oxidizing agent and an electrolyte which contains a counter anion with dopability to form the π -conjugated copolymer on the dielectric film.

24. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the polymerization is carried out within a temperature range of -30°C to 40°C .

25. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the polymerization is carried out in the atmosphere of a relative humidity of 5% to 70%.

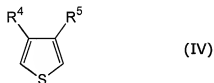
26. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the porous valve action metal contains at least one metal selected from the group consisting of aluminum, silicon, tantalum, niobium, titanium and zirconium.

27. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, comprising using pyrrole-based compound as represented by the general formula (III):



wherein R¹ and R² independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom and cyano group, alternatively R¹ and R² are bonded together at any positions to form a 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure that may contain an ether bond and/or a sulfonyl bond, and R³ represents a hydrogen atom,

and using thiophene-based compound as represented by the general formula (IV):



wherein R⁴ and R⁵ independently represent a monovalent group selected from the group consisting of hydrogen atom, linear or branched, saturated or unsaturated alkyl group having 1 to

10 carbon atoms, linear or branched, saturated or unsaturated alkoxy group having 1 to 10 carbon atoms, linear or branched, saturated or unsaturated alkyl ester group having 1 to 10 carbon atoms, halogen atom and cyano group, alternatively, R⁴ and R⁵ are bonded together at any positions to form a 3 to 7-membered, saturated or unsaturated, hydrocarbon ring structure that may contain an ether bond and/or a sulfonyl bond.

28. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the pyrrole-based compound is pyrrole and the thiophene-based compound is 3,4-ethylenedioxythiophene.

29. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the oxidizing agent having a polymerization-initiating property contains an iron salt or a persulfate salt.

30. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the electrolyte containing a counter anion with dopability contains an organic sulfonic acid compound.

31. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the polymerization step is carried out multiple times.

32. (withdrawn): The method for producing a solid electrolytic capacitor according to claim 23, wherein the maximum thickness of the solid electrolyte layer formed on the dielectric film is 10 μm to 200 μm .